SPRINKLER IRRIGATION SYSTEM DESIGN

NAME _____ DATE _____ PREPARED BY _____

SWCD _____ COUNTY _____ ENGR. JOB CLASS _____

INVENTORY

Total Acres _____ Crop Acres _____ Climatic Area _____

Water Source _____ Amt. Available _____ gpm, _____ acre ft _____ Seasonal variation _____ gpm to _____ gpm

Power Source, Electric _____ volts, _____ phase. Internal combustion engine _____ Fuel type _____ Other _____

SOILS DATA

| USDA limiting soil series | Total Available WHC (in/ft) | | | | | Depth to | | Maximum intake rate (in/hr) |
	0−1	1−2	2−3	3−4	4−5	Inhibiting layer (ft)	Water table (ft)	

WEIGHTED CONSUMPTIVE USE

Crops	Acres (A)	June	July	August

IRRIGATION REQUIREMENTS

Crops	Root Zone Depth (ft)	Total AWHC (inches)	Stress Point (%AWHC)	Max. Net Replacement (inches)	Peak Daily C.U.	Max. Freq. at Peak C.U. at Max. Net

DESIGN DATA

Based on weighted consumptive use, _____ % Eff., _____ MPH winds, _____ Wind Factor

| | Application | | Peak Daily C.U. * (Weighted) | Frequency (F) (Days) | System Requirements | |
	Net (D)	Gross			(Total gpm) (Q)	gpm/ac.
Maximum						

$$Q = \frac{453 \ A \ D}{F \ H \ Eff.} \text{ system capacity}$$

H = Total operating hours/day. Use 23 hours.

* Use controlling weighted monthly consumptive use in Washington Irrigation Guide and determine daily consumptive use from Table 5, NRCS Technical Release 21, Irrigation Water Requirements.

SPRINKLER SYSTEM DESIGN

Nozzle Spacing _____ (S_L), Lateral Spacing on Mainline _____ (S_m), Min. wetted dia.= $\dfrac{(S_m)}{(\text{wind factor})}$ = _____ ft.

Sprinkler Head, make _____ Model _____ nozzle size _____ GPM _____ PSI _____ wetted dia. _____

Application rate _____ in/hr, Applic. time _____ hrs/set. Net Applic.= _____ (rate, in/hr) X _____ (eff) X _____ (hrs/set)= _____ in.

Max. Irr. Cycle= $\dfrac{(\text{Net Applic.} \qquad)}{(\text{Peak Daily C.U.} \qquad)}$ = _____ days. Min. No. Laterals= $\dfrac{(\text{No. Lateral Sets} \qquad)}{(\text{Max. Irr. Cycle} \qquad)(\text{Moves/day} \qquad)}$ = _____

Designed Laterals: No. _____ , Dia. _____ , Type _____ , Moves/day _____ . Sys: Cap.=(no. of nozz. _____) X (gpm/nozz. _____)= _____ gpm.

LATERAL DESIGN

Allowable Friction Loss = 0.2 X (nozz. psi _____ $\pm \dfrac{\text{elev.}}{2.31}$)= _____ psi. Actual Friction Loss (worst condition) _____ psi.

Pressure require at the Mainline: P = (nozz. psi _____) + 3/4 X (lat. fric. psi _____ $\pm \dfrac{\text{elev.}}{2.31}$) = _____ psi.

MAINLINE DESIGN

Mainline: material _____ , psi rating _____ , other description, PIP, IPS, SDR, GATE, CLASS, etc. _____

Friction factor used _____ . Mannings "n" factors: plastic under 6" = 0.010, over 6" = 0.009, steel = 0.012, asb. cem. = 0.01

Desirable mainline velocities are 5 fps or less (required on PVC and AC pipe).

Station		Diameter of Pipe	Flow (gpm)	Velocity (fps)	Distance	Friction Loss per 1000'	Friction Loss this Section (ft)	Accum. Friction Loss	Remarks
From	To								

DETERMINATION OF TOTAL DYNAMIC HEAD

Pressure required at Main _____ psi _____ ft

Friction loss in Main _____ psi _____ ft

Elevation rise/fall _____ psi _____ ft

Lift (water surface to pump) _____ psi _____ ft

Column Loss _____ psi _____ ft

Miscellaneous Loss _____ psi _____ ft

Total (TDH) _____ psi _____ TDH must be in feet for horsepower equation

HORSEPOWER REQUIREMENTS

$$BHP = \frac{(TDH \qquad) \; X \; (GPM \qquad)}{3960 \; X \; (Pump \; Eff. \qquad)} = \underline{\qquad} \; HP$$

Pump curve data attached.   yes ( )   no ( )   If not supplied, NRCS will assume 70% efficiency.

Bill of material attached.   yes ( )   no ( )

HORSEPOWER REQUIREMENTS

	Needed	Not Needed	Location	Size	Construction Check. Installed
Expansion Couplers					
Reducers					
Anchors					
Thrustblocks					
Bends					
Tees					
Outlets					
Surge Chamber					
Drain Valves					
Check Valves					
Pressure Relief Valves					
Air-Vacuum Release Valves					
Pipe Supports					
Corrosion Protection					
Other:					

Attach any special drawing

COMMENTS: _____

_____

_____

_____

_____

_____

_____

LOCATION AND LAYOUT MAP

Show:

Location of acres not sprinkled.

Direction of prevailing wind.

Elevations (contour preferable).

Stations on mainline in feet or
    alphabetical notation.

Pump location. ☒

Mainline location ├──┼┼──┼┼──┤

Lateral layout

    W = wheel line

    H = hand move

    S = solid set

Direction of lateral move.

North Arrow

Location of nearest section
    corner.

Scale _____

Township _____

Range _____

Section _____

SYSTEM DESIGNED BY: (Organization) _____ (Signature) _____ (Date) _____

(NRCS ONLY)   Reviewed by: _____ Date _____

                Approved by: _____ Date _____

REMARKS _____

_____

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